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## CHAPTER 4

## PROPORTIONING

4-1. Mixture proportioning. Before any concrete is placed, the Contractor will present a mix design which will give the required flexural strength. In addition, this design should demonstrate that water-cement ratio, air content, and workability are within specified requirement ranges. Based on this mix, 6 by 6 inch test specimens should be made, cured, and tested in accordance with standard procedures to establish the flexural strength of this concrete. Enough test specimens should be made to provide for three tests at 7 days, three at 28 days, and three at 90 days for airfield and three tests at 7 days and three tests at 28 days for roads.

4-2. Mixture proportions. The Contracting Officer will require such changes in the mixture proportions as necessary to maintain the workability, strength, and quality required by the contract specifications. The mixture proportions determined by initial testing will be used in starting paving operations. Adjustments will be made by the Contractor as necessary to establish the mixture proportions best suited for job conditions and materials used. Subsequent mixture adjustments will be made when necessary, but usually they are of a minor nature as required to compensate for variations in gradings and the moisture content of the aggregate.

4-3. Workability. The concrete slump will not exceed 2 inches. Within this maximum limit, the slump will be maintained at the lowest practical value suitable for prevailing weather conditions and for equipment and methods used in placement of the concrete. For small paved areas where vibration is not required, a slump in excess of 2 inches may be permitted, but in no case will the slump exceed 4 inches. Slump for slip-form paving of airfield and heliport pavements should be specified in a range of 1/2 to 1-1/2 inches.

4-4. Strength. Control of the strength of the concrete mixture will be based on tests of concrete specimens taken during the paving operations. Pavements to be used by aircraft are designed on the basis of the flexural strength that the concrete is expected to attain at the age of 90 days, and specimens will be tested at this age for use in the evaluation of pavements. Since the period necessary to obtain the 90-day field strengths is too great to exercise proper control of the concrete during pavement construction, a 28-day strength requirement will be included in the contract specifications. Flexural-strength tests will be made at the age of 28 days to determine compliance with the 28-day strength requirement. In addition, 7-day strength tests will be made to provide an early indication of the concrete strength. The average strength at the age of 28 days of any five consecutive individual test values representing each concrete mixture will be not less than the specified strength at the age of 28 days, and not more

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than 20 percent of the individual values will be less than the specified strength. Adjustments of the concrete mixture proportions will be made as necessary to maintain this strength control.